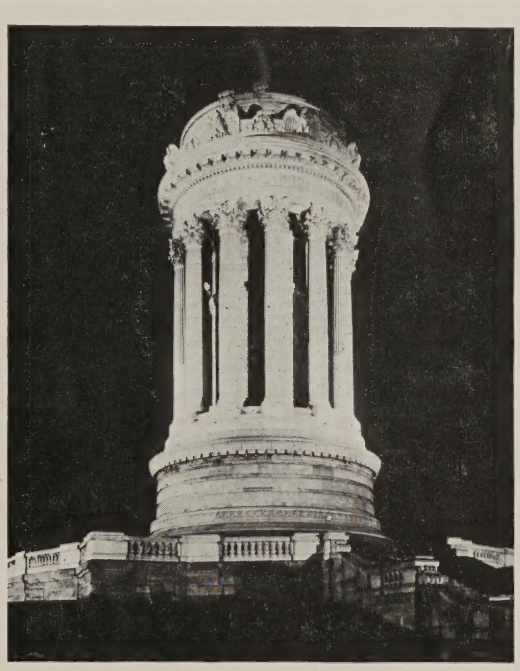
GEA-161-A
Supersedes GEA-161

FLOODLIGHTING

INCLUDING
SEARCHLIGHT & AIRPORT
LIGHTING



GENERAL ELECTRIC COMPANY
SCHENECTADY, N. Y.

Introduction

THE modern practice of electric illumination has established new standards of utility and lofty ideals of beauty. Artificial light has become not only a potent and necessary tool of industry and commerce, but, as well, an efficient auxiliary of decorative and architectural art. The illuminating engineer, supplementing the rigid exactitude of science with a sympathetic appreciation of form and color, is exercising a profound influence on almost every activity of life—from the ordinary routine of its work to many of its finest delights.

These aspects of present-day illumination find vivid and distinguished expression in the art of floodlighting. Its field of service extends from the freight yard and wharf to the splendid creations of the architect's genius. It expedites, by night, the work of the builder and protects the completed structure from marauders who depend on the cover of darkness. From an unseen source, it silvers the temples of government, of finance, and of commerce, searching out every beauty of line and decoration, suspending them, as it were, in exquisite relief against the dark sky, and giving new emphasis to the material fabrics and to the public functions which they symbolize.

Under its beams, monuments to great men and to great causes convey their message at night as well as by day; the spectacular aspects of nature—massed foliage or mighty waterfall—preserve their charm during the hours when men are free to enjoy them; and, with more intimate touch, community playgrounds are made available, when the day's work is done, for the common recreation and the health that comes with open-air play. Floodlighting has also made possible the effective illumination of outdoor pageants, carnivals, and other spectacles, and has thus given new encouragement to a colorful art that is yearly growing in public appreciation.

Perhaps the most conspicuous triumphs of floodlighting during the last fifteen years have been at national and international expositions. Men and women, by hundreds of thousands, have carried away as their most vivid impression the glory of color that transfigured pallid buildings and sculpture, and summoned into nightly bloom a vast flower of many-hued flame. It is difficult to realize that the art which thus adorned the Panama-Pacific Exposition and which adds a flood of color to the flow of Niagara Falls is the same that safeguards the making up of a freight train or facilitates the unloading of a barge. It is only by contrasting these extremes that one can appreciate the immense scope of floodlighting in its many commercial and artistic aspects—that one can understand its important place as a constructive aid to the advance of industry and culture.

The General Electric Company has erected specially equipped laboratories in which lighting specialists, engineers and artists devote their skill and experience to new accomplishments in the technique of floodlighting—to new applications and new effects. A few of these results are pictured and described on the following pages, and a brief review is offered of the principal types of projectors in which profound research has embodied a brilliantly creative service.

NOVALUX FLOODLIGHTING PROJECTORS

FORM L-1

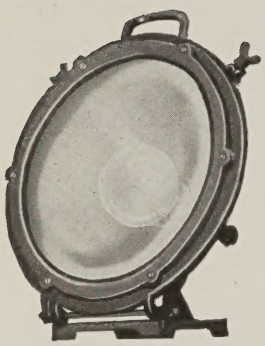


Fig. 1
(Photo No. 265326)
Cat. No. 166012

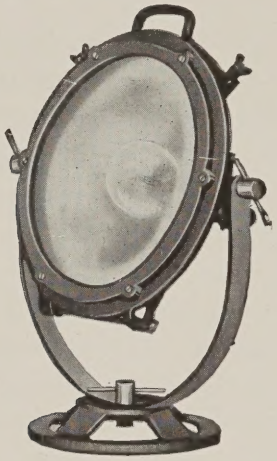


Fig. 2
(Photo No. 265326)
Cat. No. 189962

Fig. 3
(Photo No. 265326)
Cat. No. 195852

DESCRIPTION

The Form L-1 projector consists essentially of a 16-in. highly polished, aluminum parabolic reflector. This is secured to a cast-iron frame which also supports the lens door. The door is fastened in a closed position by means of two hinged bolts and wing nuts. A sponge-rubber gasket between the lens and door frame renders the unit weatherproof. The cast-iron socket is adjustable and is held in place by a clamp with wing nut. There are three methods of mounting these projectors:

1. Hinged to a flat base.
2. On trunnion fastened to swivel base. Wing nuts furnished for adjusting.
3. On trunnion fastened to pipe stand which is fastened to cast-iron base. Wing nuts furnished for adjusting.

Two coats of black japan finish are given to all exterior parts. Best results are obtained with the 500-watt floodlighting lamp.

Fig. 4
(Photo No. 442752)
San Joaquin Power Building, Fresno, Calif.
Felchlin Company, Architects

NOVALUX FLOODLIGHTING PROJECTORS

FORM L-3

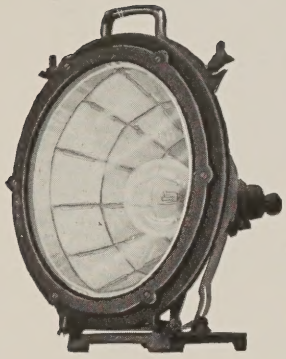


Fig. 5
(Photo No. 265329)
Cat. No. 189668

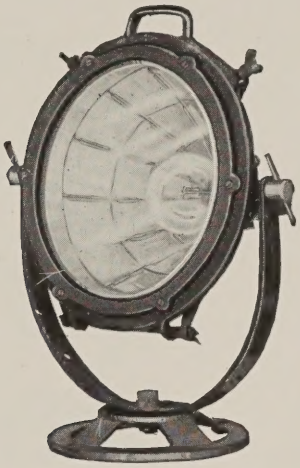


Fig. 6
(Photo No. 265329)
Cat. No. 195865

Fig. 7
(Photo No. 265329)
Cat. No. 195866

DESCRIPTION

The L-3 projector is identical with the L-1 except the reflector. This consists of a number of sectional glass mirrors set at angles with each other and arranged in three zones. They are held together by metal strips and the entire reflector is protected by a sheet-steel casing.

This projector gives a wider angle beam than the L-1 but a shorter throw. Best results are obtained with the 500-watt floodlighting lamp. Two coats of black japan finish are applied to all external parts.

Fig. 8
(Photo No. 112502)
Pan-American Building at Washington, District of Columbia
Paul Cret, Architect

NOVALUX FLOODLIGHTING PROJECTORS

FORM L-9

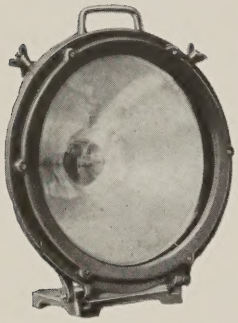


Fig. 9
(Photo No. 275678)
Cat. No. 289487

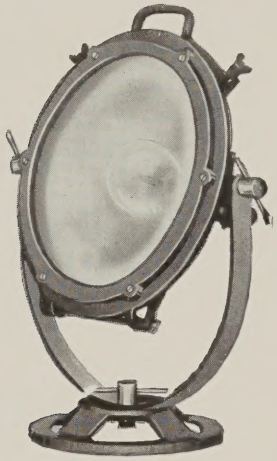


Fig. 10
(Photo No. 265326)
Cat. No. 195863

Fig. 11
(Photo No. 265326)
Cat. No. 195864

DESCRIPTION

The Form L-9 projector is identical with the Form L-1 except the reflector, which is constructed of glass and coated on the outside with silver. The silvered surface is hermetically sealed with a thick copper coating which obviates the necessity for an outer casing. With a clear lens, the beam angle of this projector is slightly greater than that of the Form 1.

Best results are obtained with the 500-watt floodlighting lamp.

Two coats of black japan are applied to all external parts.

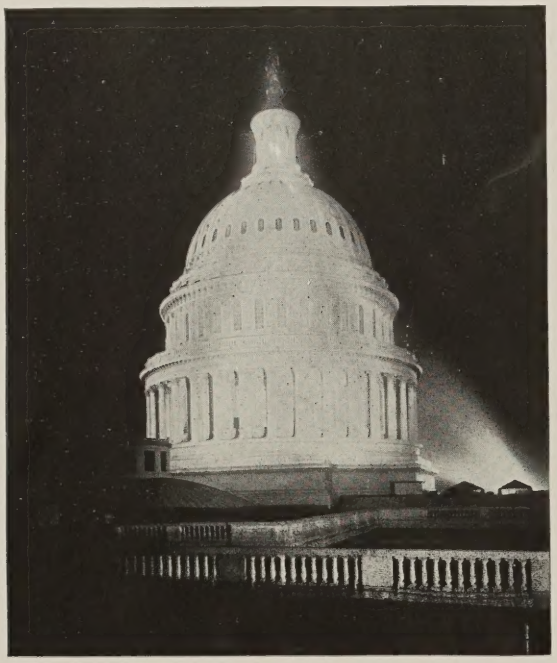


Fig. 12
(Photo No. 386564)
Dome of Capitol at Washington, D. C.

NOVALUX FLOODLIGHTING PROJECTORS

FORM L-11

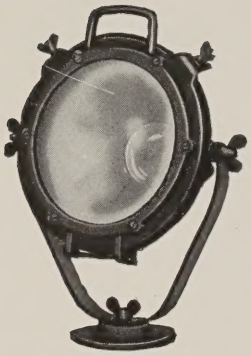


Fig. 13
(Photo No. 265338)
Cat. No. 197450

Fig. 14
(Photo No. 265338)
Cat. No. 195867

DESCRIPTION

This projector is for use with a 250-watt floodlighting lamp only. The reflector frame and door construction is similar to that of the L-1. The reflector consists of a patented parabolic glass reflector, silvered and coppered. The reflector forms the casing like the reflector of the Form L-9, and is not enclosed in a sheet-metal housing. The projector can be mounted in two ways:

1. On trunnion fastened to swivel base. Wing nuts furnished for adjusting.

2. On trunnion fastened to pipe stand which is fastened to cast-iron base. Wing nuts furnished for adjusting.

Two coats of black japan finish are given to all external parts.

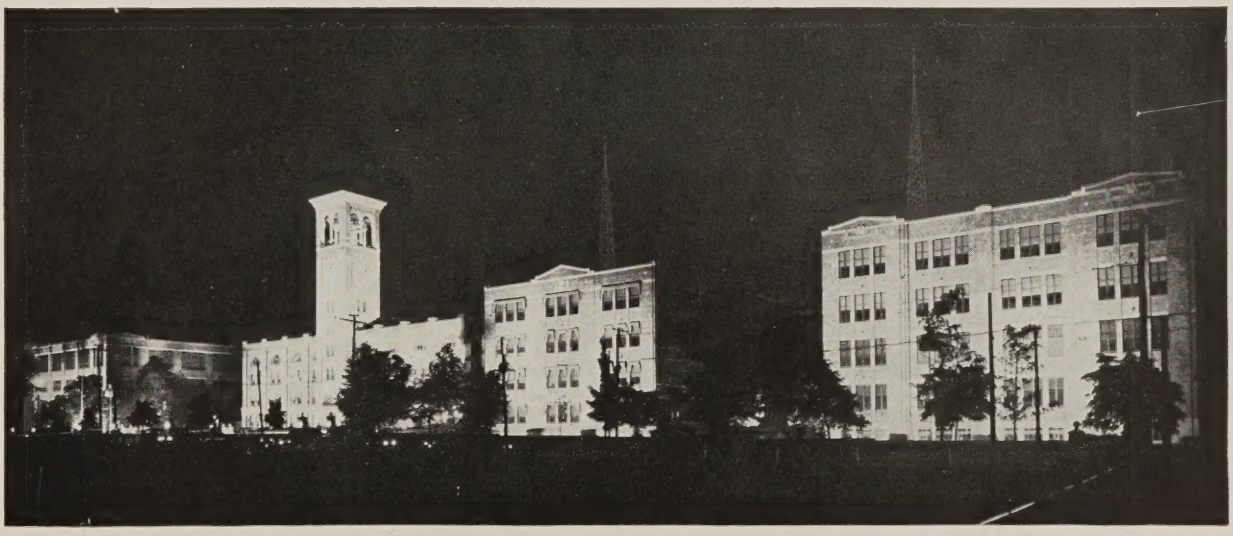


Fig. 15
(Photo No. 424912)
United States Playing Card Company Buildings, Cincinnati, Ohio

NOVALUX FLOODLIGHTING PROJECTORS
FORM L-15

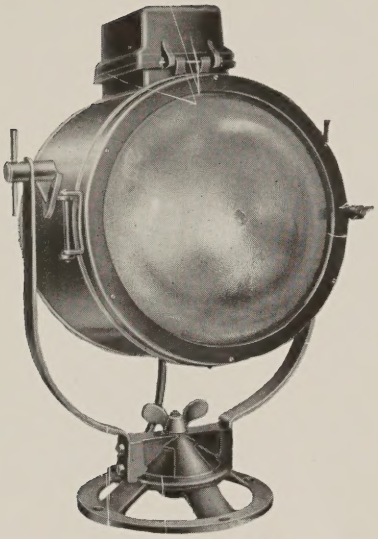


Fig. 16
(Photo No. 277381-1)
Cat. No. 3049412

Fig. 17
(Photo No. 277382-1)
Cat. No. 3049411

DESCRIPTION

This projector is a universal type and can be adapted to all classes of floodlighting. Lamps of 110 or 220 volts and from 300 to 1000 watts can be operated.

It consists of a ventilated and galvanized sheet-metal housing within which is mounted a deep composite reflector made of silvered and coppered glass. At the top of the casing and protected by a hinged ventilating cowl is the universal ball and socket focusing mechanism which permits adjustment in any direction. The projector can be mounted in two ways:

1. On trunnion fastened to swivel base. Wing nuts furnished for adjusting.

2. On trunnion fastened to pipe stand which is fastened to cast-iron base. Wing nuts furnished for adjusting.

Best results are obtained with the 1000-watt general service lamp.

Two coats of black japan finish are given to all external parts.

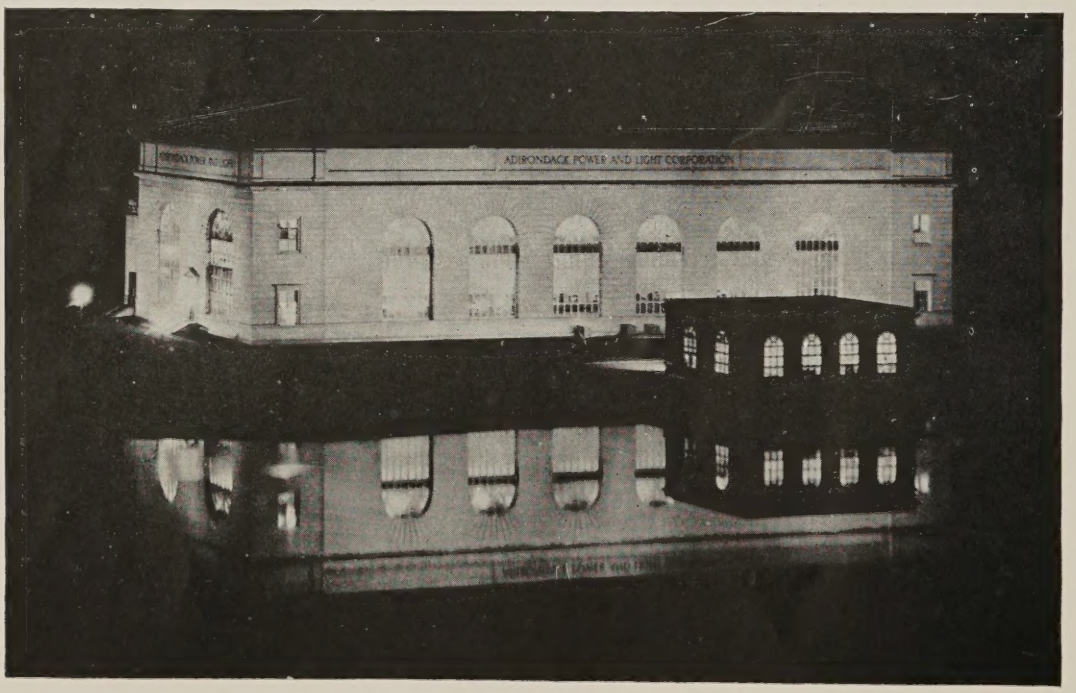


Fig. 18
(Photo No. 434367)
Adirondack Power and Light Corporation Station, Amsterdam, N. Y.
McKim, Mead and White, Architects

NOVALUX FLOODLIGHTING PROJECTORS

FORM L-20

Fig. 19
(Photo No. 270876)
Cat. No. 257660

DESCRIPTION

This projector is similar to the Form L-11 except it may be operated with a 200-watt, PS-30 general service lamp or 250-watt, G-30 floodlighting lamp. A patented parabolic glass reflector, silvered and coppered, is mounted within a sheet-metal casing. A sheet-metal door frame is hinged to the casing and fastened by a hinged bolt and wing nut.

The projector is furnished mounted on rocker fastened to swivel base.

Best results are obtained with the 200-watt general service lamp.

If the 200-watt general service lamp is used, remove the spacer which is placed between the socket and the inside of the socket holder. This change will compensate for the difference in light centers between the two lamps.

Two coats of black japan finish are applied to all external parts.

Fig. 20
(Photo No. 436152)
Montclair Memorial, Montclair, N. J.

Fig. 21
(Photo No. 428620-1)
American Radiator Company Building, New York City

NOVALUX FLOODLIGHTING PROJECTORS

Submersible Fountain Type

FORM L-23

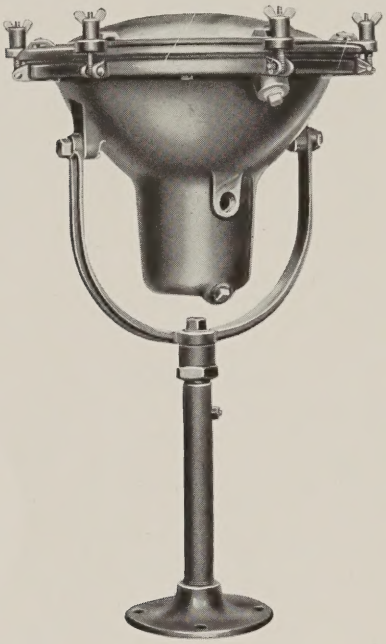


Fig. 20
(Photo No. 277022)
Cat. No. 3049414

DESCRIPTION

This projector is constructed of non-ferrous material. The door frame, casing, and trunnion bracket are of special aluminum alloy.

It is equipped with a servicing device which consists of a large brass tube that screws into a brass base plate; and a smaller tube, assembled to the trunnion bracket, which slides inside of the larger tube. The smaller tube is slotted and fitted with three bayonet joints. These engage a stop screw which is assembled into the larger tube and projects inside it. The projector may be raised or lowered so that it can be lifted above the surface of the water in the fountain in order that the front door may be removed and the device serviced or relamped.

The front-door glass is gasketed by rubber packing, and the door casting is gasketed against the casing.

The projector has a ¾-in. pipe-tapped hole midway of the casing for a ¾-in. pipe nipple through which the lead cable passes. A wiped joint can be made between the brass bushing and the lead cable.

The device is also provided with two other ¾-in. tapped holes to which a drain pipe, which may be a rubber hose or a flexible lead cable, can be attached. The reason for the two holes is that when the projector is set with the beam in the vertical position the bottom hole can be used for draining away any condensation which may occur inside of the projector. This also permits atmospheric pressure always to be maintained within the projector. If the projector is used with the beam horizontal or nearly so, the plug in the top hole can be removed and put into the bottom hole and the drain pipe can then be put into the hole from which the plug was removed. It is very advisable when installing these projectors to put the drain pipe in because it is desirable that atmospheric pressure be maintained. Otherwise the heat from the lamp will change the density of the air inside the projector, and, when the lamp is turned off and the projector cools, there is a tendency toward a vacuum or, at least, a lower air pressure. This is likely to create a breathing effect and may, under some circumstances, cause water to enter the projector.

A sliding screw focusing mechanism is provided which allows the lamp to be moved along the axis of the reflector either up or down by pulling or pushing the bulb.

The 16-in. glass reflector is silver plated and coated with electrolitically deposited copper.

Either the 500-watt or 1000-watt, 110-volt floodlighting lamp may be used.

NOVALUX FLOODLIGHTING PROJECTORS

DIMENSIONS

(Dimensions for Reference Only—Not for Construction)

FORM	CAT. NO.	FIG. NO.	DIMENSIONS IN INCHES										
			Overall			D	E (Dia.)	F	G	H	J	K (Max.)	L
			A (Max.)	B	C								
L-1	166012	22	14 5/16	18	21	10 1/4	14 3/8	....	....	....	....	....	....
L-1	189962	23	16 15/16	22	25 5/8	14 7/8	14 3/8	18	4	12	2 1/8	14 15/16	....
L-1	195852	24	16 15/16	22	58 1/4	47 1/2	14 3/8	18	4	12	2 1/8	14 15/16	....
L-3	189668	22	18 11/16	18	21	10 1/4	14 3/8	....	....	....	....	....	....
L-3	195865	23	20 11/16	22	25 5/8	14 7/8	14 3/8	18	4	12	2 1/8	18 11/16	....
L-3	195866	24	20 11/16	22	58 1/4	47 1/2	14 3/8	18	4	12	2 1/8	18 11/16	....
L-9	195863	25	14	22	25 5/8	14 7/8	14 3/8	18	4 1/8	12	2 1/8	....	....
L-9	195864	26	14	22	58 1/4	47 1/2	14 3/8	18	4 1/8	12	2 1/8	....	....
L-9	289487	22	14 5/16	18	21	10 1/4	14 3/8	....	....	....	....	....	....
L-11	197450	27	12 9/16	17 1/2	20 1/2	12	10 1/8	13 1/2	2 13/16	6 1/4	1 1/8	12 1/4	....
L-11	195867	28	15 7/16	17 1/2	54	45 1/2	10 1/8	13 1/2	2 13/16	12	2 1/8	12 1/4	....
L-15	3049412	29	15 1/2	21 3/8	30 3/4	17 3/4	14 3/8	16 5/8	8 7/16	12	....	....	21 1/8
L-15	3049411	30	15 1/2	21 3/8	62 3/4	49 3/4	14 3/8	16 5/8	8 7/16	12	....	....	53 1/4
L-20	257660	31	12 3/16	15 1/8	16	9 1/8	....	13 3/4	3 15/16	6	....	14 9/32	....
L-23	3049414	32	40	19 3/4	32	....	....	....	....	....	....	....	....

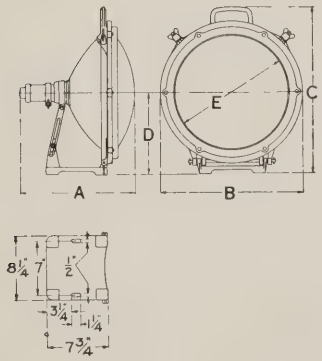


Fig. 22
(K-1222784)
Forms L-1, L-3 and L-9

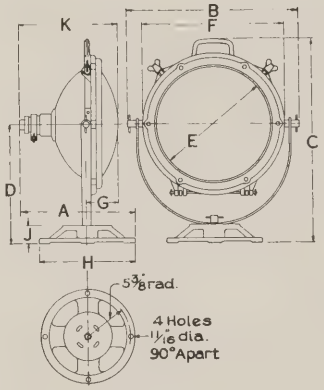


Fig. 23
(K-1217994)
Forms L-1 and L-3

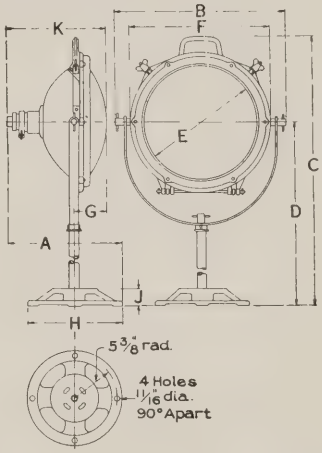


Fig. 24
(K-1217994)
Forms L-1 and L-3

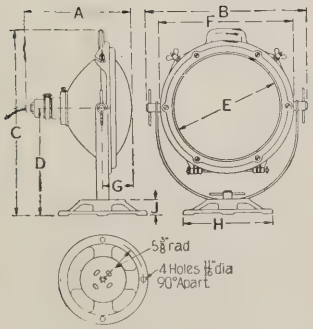


Fig. 25
(K-1222784)
Form L-9

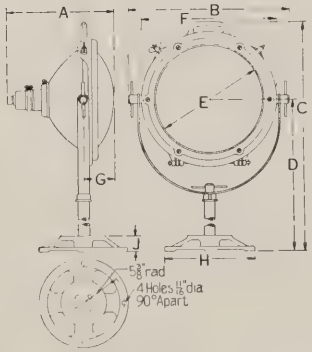


Fig. 26
(K-1222783)
Form L-9

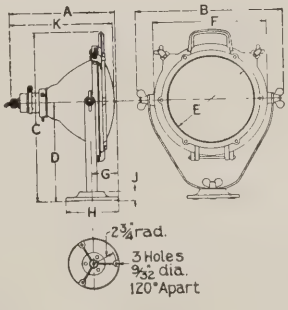


Fig. 27
(K-1222692)
Form L-11

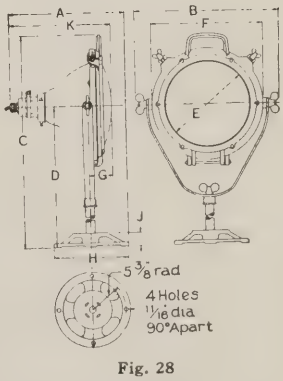


Fig. 28
(K-1222786)
Form L-11

NOVALUX FLOODLIGHTING PROJECTORS

DIMENSIONS (Cont'd)

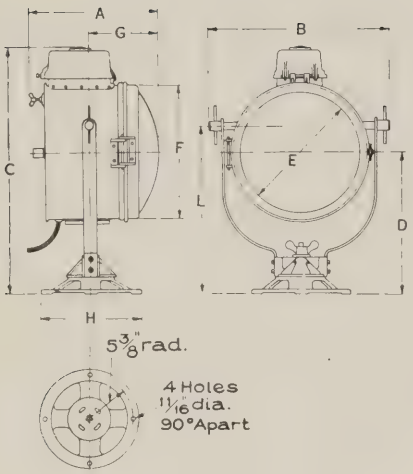


Fig. 29
(K-1238292)
Form L-15

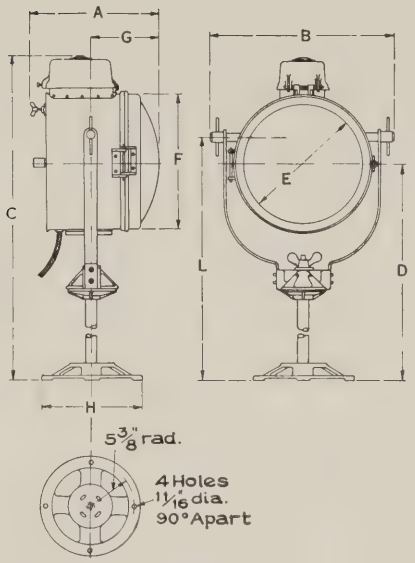


Fig. 30
(K-1238292)
Form L-15

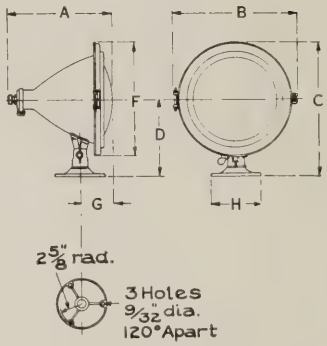


Fig. 31
(K-1238292)
Form L-20

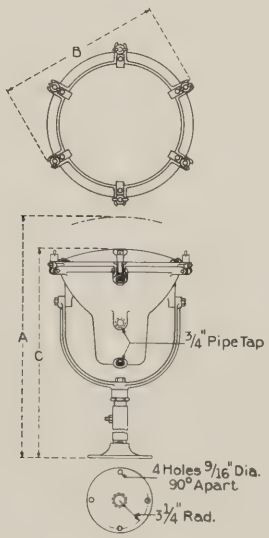


Fig. 32
(K-3717123)
Form L-23

NOVALUX FLOODLIGHTING PROJECTORS

FORMS L-1, L-3, L-9, L-11, L-15, L-20, AND L-23

For 110- and 220-volt Multiple Circuits or with IL Series Multiple Transformer

FORM	LAMP RATING	REFLECTOR	BASE	FIG. NO.	FRONT-DOOR GLASS	CAT. NO.	(Mazda Lamps not Included) LIST PRICE Class H	WT. IN LB. Ship.	WT. IN LB. Net
L-1	Lamp Watts †G-40 500 Floodlighting Mogul Base	16 In. Parabolic Aluminum	Hinged	1	Clear	166012	$22.00	75	31
					Heavily Stippled	2X390	24.20		
					40 Deg. Spredlite	3049418	25.00		
			Swivel and Trunnion	2	Clear	189962	24.50	82	38
					Heavily Stippled	2X392	26.70		
					40 Deg. Spredlite	3049417	27.50		
			Swivel and Pipe Stand	3	Clear	195852	25.50	89	45
					Heavily Stippled	2X394	27.70		
					40 Deg. Spredlite	3049425	28.50		
L-3	†G-40 500 Floodlighting Mogul Base	16 In. Wide Angle Sectional Glass	Hinged	5	Clear	189668	34.50	76	32
					Heavily Stippled	2X396	36.70		
					40 Deg. Spredlite	3049426	37.50		
			Swivel and Trunnion	6	Clear	195865	36.50	85	41
					Heavily Stippled	2X398	38.70		
					40 Deg. Spredlite	3049427	39.50		
			Swivel and Pipe Stand	7	Clear	195866	37.50	118	47
					Heavily Stippled	2X400	39.70		
					40 Deg. Spredlite	3049428	40.50		
L-9	†G-40 500 Floodlighting Mogul Base	16 In. Medium Angle Glass	Hinged	9	Clear	289487	32.00	79	34
					Heavily Stippled	3049430	34.20		
					40 Deg. Spredlite	3049431	35.00		
			Swivel and Trunnion	10	Clear	195863	34.00	86	42
					Heavily Stippled	2X402	36.20		
					40 Deg. Spredlite	3049432	37.00		
			Swivel and Pipe Stand	11	Clear	195864	35.00	92	48
					Heavily Stippled	2X403	37.20		
					40 Deg. Spredlite	3049433	38.00		
L-11	†G-30 250 Floodlighting Medium Base	10½ In. Parabolic Glass	Swivel and Trunnion	13	Clear	197450	24.50	70	18
					Heavily Stippled	2X404	25.30		
					40 Deg. Spredlite	3049434	25.90		
			Swivel and Pipe Stand	14	Clear	195867	26.50	75	23
					Heavily Stippled	3049436	27.30		
					40 Deg. Spredlite	3049437	27.90		
L-15	*PS-52 1000 *PS-52 750 *PS-40 500 *PS-35 300 General Service Mogul Base	15½ In. Wide Angle Glass	Swivel and Trunnion	16	Lightly Stippled	‡3049412	54.00	130	59
					Heavily Stippled	2X405	56.20		
					40 Deg. Spredlite	3049435	57.00		
			Swivel and Pipe Stand	17	Lightly Stippled	‡3049411	55.50	138	67
					Heavily Stippled	2X406	57.70		
					40 Deg. Spredlite	3049438	58.50		
L-20	PS-30 200 General Service or G-30 250 Floodlighting Medium Base	10½ In. Parabolic Glass	Swivel and Rocker	19	Clear	257660	30.50	70	18
					Heavily Stippled	2X407	31.30		
					40 Deg. Spredlite	3049439	31.90		
L-23	G-40 500 G-40 1000 Floodlighting Mogul Base	16 In. Medium Angle Glass	Swivel and Pipe Stand	20	Clear	3049414	83.00	85	37

Prices subject to change without notice.

* General service lamps can be purchased for 110, 115, 120 or 220, 230, 240, and 250 volts.

† Floodlighting lamps can be purchased only for 110, 115, and 120 volts.

‡ Lightly stippled front-door glass recommended although L-15 projector can be furnished with clear front-door glass if desired, at same price. If L-15 projector with clear front-door glass is desired specify Cat. No. 224810 instead of Cat. No. 3049412 or Cat. No. 224811 instead of Cat. No. 3049411.

(1) If plain Red, Amber, Blue, or Green front-door glass is required for L-1, L-3, L-9, L-15, or L-23 add **$5.30 to List** Price of projector with clear lens. Stippled colored lens not available.

(2) If plain Red, Amber, Blue, or Green front-door glass is required for L-11 or L-20 add **$3.00 to List** Price of projector with clear lens. Stippled colored lens not available.

(3) Mogul sockets furnished on L-1, L-3, and L-9 projectors. If 250-watt lamp is to be used specify when ordering to add Cat. No. GE070 adapter, no addition in price.

(4) For lead plating the L-15 projector add **$4.25 to List** Price.

APPLICATION

Briefly, a floodlighting projector consists of a reflector and socket mounted in a weatherproof casing and arranged to take a focus-type MAZDA lamp.

The socket can be moved forward or backward in order to focus the lamp; when the proper focus is obtained, the socket can be locked in position. All parts are readily accessible, and the units are weatherproof and can be mounted either outdoors or indoors.

It is possible economically and effectively to illuminate surfaces where lighting by the ordinary method of employing several lamps and reflectors is impractical.

Following are a few of the uses of floodlighting:

Floodlighting Public Buildings, Monuments, Fountains, etc.

Every municipality has some notable example of architecture, a statue, a square, or historical place in which the community has considerable pride. The floodlighting projector makes possible the illumination of any such structure and gives it prominence by night.

Floodlighting Billboards and Signs

G-E floodlighting projectors for billboard lighting can be installed in practically any convenient place; obviating the use of complicated wiring, increasing the working hours of the billboard, and enhancing the advertising value through the contrast of the bright surface against the dark background of night.

Floodlighting in Construction Work

Wherever contractors are called upon to do construction work at night they will find G-E floodlighting projectors of considerable assistance. Temporary installations can be easily and quickly made.

Floodlighting for Protection

Important railroad bridges, docks, power stations, aqueducts, reservoirs, etc. that are nightly guarded against mischief-makers and prowlers are much more completely protected when G-E floodlighting projectors are used.

Floodlighting of Winter Sports

For lighting winter carnivals, toboggan slides, skating ponds, hockey, curling, and skating rinks, the G-E floodlighting projector is particularly useful because it provides a powerful light and obviates the necessity of poles which often become dangerous obstructions.

Floodlighting for Pageants

The floodlighting projector is inherently suited to the lighting of pageants, carnivals, outdoor expositions, displays during merchants' weeks, etc.

Floodlighting Athletic Grounds

Floodlights, mounted on poles adjacent to the grounds or on the tops of the stands and buildings of the grounds, have made it possible to hold athletic meets and to play football and baseball games at night.

NOVALUX FLOODLIGHTING PROJECTORS

METHOD OF SOLVING FLOODLIGHTING PROBLEMS

ILLUMINATION DATA

FORM	WORKING DISTANCE	LAMP 115-VOLT	FRONT-DOOR GLASS	BEAM			TOTAL LUMENS	F	PHOTO-METRIC CURVE
				Angle in Deg.	Candles	Lumens			
L-1	Up to 400 Ft.	500 Watt Floodlighting	Clear	11	168000	2000	4840	0.19	C-61,137
			Heavily Stippled	60	104000	2460	4620	1.15	C-61,249
			40 Deg. Spredlite						
L-3	Up to 100 Ft.	500 Watt Floodlighting	Clear	50	21000	3270	4950	0.93	C-61,148
			Heavily Stippled	90	6500	4320	4680	2.00	C-61,149
			40 Deg. Spredlite						
L-9	Up to 400 Ft.	500 Watt Floodlighting	Clear	12	310000	3405	6100	0.21	H-130,841
			Heavily Stippled	50	22800	3840	5780	0.93	H-130,842
			40 Deg. Spredlite						
L-11	Up to 200 Ft.	250 Watt Floodlighting	Clear	14	52000	990	1800	0.25	C-61,242
			Heavily Stippled						
			40 Deg. Spredlite						
L-15	Up to 175 Ft.	1000 Watt General Service	Lightly Stippled	37	67500	6900	12640	0.67	H-131,634
			Heavily Stippled	86	18700	8700	10900	1.87	C-61,221
			40 Deg. Spredlite						
L-20	85 to 200 Ft.	250 Watt Floodlighting	Clear	14	52000	990	1800	0.25	Same as C-61,242
			Heavily Stippled						
		or	40 Deg. Spredlite						
		200 Watt General Service	Clear	32	16500	1250	1980	0.57	H-107,613
			Heavily Stippled	65	4900	1320	1755	1.27	H-107,614
			40 Deg. Spredlite						

Beam diameter in feet = Distance from projector in feet × Factor F.

INTENSITIES FOR FLOODLIGHTING

BUILDING SURFACES	CHARACTER OF SURROUNDINGS		
	White Way	Resi-dences	Parks
Dark-colored buildings, i.e., surfaces of red brick, clinker brick, brown stone, etc.	20 F.C.	15 F.C.	10 F.C.
Medium-colored buildings, i.e., surfaces of concrete, granite, etc.	15 F.C.	10 F.C.	5 F.C.
Light-colored buildings, i.e., surfaces of glazed terra cotta, marble, etc.	10 F.C.	5 F.C.	3 F.C.

TYPICAL PROBLEM

Assume a light-colored building, 100 by 80 ft., total area 8000 sq. ft. Location, residential section. Units must be installed 25 ft. from surface to be illuminated.

What type of floodlighting unit, foot-candle intensity, and number of units are required?

FORMULA FOR NUMBER OF PROJECTORS

$$N = \frac{A \times E}{L}$$

N = Number of projectors.
A = Area of building façade.
E = Foot-candle intensity required.
L = Beam lumens delivered by one projector.

SOLUTION OF PROBLEM

Factors given: Working distance, 25 ft.; surroundings, residential section; surface of building, light. (8000 sq. ft.)

Refer to the formula for beam diameter in feet given above and at a working distance of 25 ft. The L-3 projector is selected because its beam covers a large area, being a wide angle projector and it proves to be the most economical projector for this application.

The table of intensities shows that a light-colored surface in a residential section requires 5 foot-candles.

Refer to formula

$$N = \frac{A \times E}{L} \quad A = 8000; \quad E = 5; \quad L = 3270$$

$$N = \frac{8000 \text{ (sq. ft. area)} \times 5 \text{ (foot-candles)}}{3270 \text{ (beam lumens—Form L-3)}}$$

$N = 12.2$, or 12 projectors

Reasonable allowance should be made for overlapping of beams so as to produce an adequate and even illumination over the area to be floodlighted. Beam diameter can be determined from formula above.

The illuminating engineering laboratory of the General Electric Company will give floodlighting recommendations concerning objects to be illuminated upon receipt of further data as follows:

Size and color.
Distance between objects.
Locations suitable for projectors.
Nature of lighting in the vicinity.

LAMP DATA

USED WITH	WATTS	VOLTS	BASE	BULB (Clear Glass)	LIFE in Hours	LUMENS	LIGHT Center LENGTH (In.)	MAXIMUM OVERALL DIMENSION (In.)	SERVICE	† LIST PRICE	STD. PKG. QTY.
L-1, L-3, L-9 and L-23 Projectors	500	110, 115, 120	Mogul	G-40	800	8150	4¼	7 1/16	Floodlighting	$3.25	12
L-11 and L-20 Projectors	*250	110, 115, 120	Medium	G-30	800	3375	3	5⅛	Floodlighting	1.75	24
L-15 Projector	300	110, 115, 120	Mogul	PS-35	1000	5400	7	9 7/16	General	1.25	24
L-15 Projector	500	110, 115, 120	Mogul	PS-40	1000	9600	7	9 13/16	General	2.00	12
L-15 Projector	750	110, 115, 120	Mogul	PS-52	1000	15000	9½	13⅛	General	3.50	8
L-15 Projector	1000	110, 115, 120	Mogul	PS-52	1000	21000	9½	13⅛	General	3.75	8
L-20 Projector	200	110, 115, 120	Medium	PS-30	1000	3200	6	8⅛	General	.80	24
L-23 Projector	1000	110, 115, 120	Mogul	G-40	800	18000	5 3/16	7⅞	Floodlighting	6.75	12

* This lamp can also be used in the L-1, L-3, and L-9 projectors with an adapter Cat. No. GE070.
† Subject to regular incandescent lamp discounts.
Prices subject to change without notice.

NOVALUX FLOODLIGHTING PROJECTORS

For Railroad Classification Yards and Other Large Area Lighting

For 110- and 220-volt Multiple Circuits or with IL Series Multiple Transformer

FORM	LAMP RATING POSITION OF BURNING	DEFLECTOR	FIG. NO.	FRONT-DOOR GLASS	CAT. NO.	LIST PRICE △Class H (Mazda Lamps not Included)	WT. IN LB. Ship.	WT. IN LB. Net
L-22 (Ventilated)	Lamp Watts * PS-52 1500 * PS-52 1000 * PS-52 750 General Service Burn Base Up Mogul Base	With Visor	1 and 2	Clear	295396	**$134.00**	181	81
				Lightly Stippled	295397	**134.00**	181	81
		Without Visor Standard Equipment		Clear	289765	**125.00**	176	76
				Lightly Stippled	270504	**125.00**	176	76
L-24 (Totally enclosed)	* PS-52 1000 * PS-52 750 General Service Burn Base Up Mogul Base	With Visor Standard Equipment	3	Clear	295398	**134.00**	175	75
				Lightly Stippled	295399	**134.00**	175	75
		Without Visor		Clear	3049401	**125.00**	170	70
				Lightly Stippled	3049395	**125.00**	170	70
L-25 (Totally enclosed)	† G-40 1000 Floodlighting Burn Base Down Mogul Base	With Visor Standard Equipment	4	Clear	295400	**134.00**	175	75
				Lightly Stippled	295401	**134.00**	175	75
		Without Visor		Clear	3049410	**125.00**	170	70
				Lightly Stippled	3049409	**125.00**	170	70

△Railroads are entitled to the same discount as G-E Distributors.

* General service lamps can be purchased for 110, 115, 120 or 220, 230, 240, and 250 volts.
† Floodlighting lamps can be purchased for 110, 115, and 120 volts.

Visor only Cat. No. 3706328P1—$9.00 List—△Class H.

Prices subject to change without notice.

Fig. 1
(Photo No. 273867)
Form L-22 Floodlighting Projector with Lightly Stippled Glass Door

Fig. 2
(Photo No. 273871)
Form L-22 Floodlighting Projector with Clear Glass Door (Showing hinged sections of Casing and Reflector)

APPLICATION

ADVANTAGES OF RAILROAD YARD LIGHTING

Over two-thirds of the gross income of our railroads is derived from the handling of freight. This movement of freight cars is continuous and anything which tends to expedite this movement with a decreased breakage and theft loss and with less chance of danger to the train operators is of the utmost importance not only to the railroads, but also to our economic life. Statistics compiled by some of our larger railroad systems prove the many advantages of proper lighting of the railroad yard.

The Committee on Illumination of the Association of Railroad Electric Engineers in November, 1923, reported the following advantages of yard lighting:

(1) Speeding up of cars handled in the yard at night.
(2) Reduction in cars damaged by rough handling and collision in the classification, yard with consequent reduction in claims, delay in delivery of goods, loss of service of damaged cars, etc.
(3) Reduction in losses due to pilfering, on account of more effective policing possible in a well-illuminated yard.
(4) Improved working conditions and increased safety for employees working in the yard.

The importance of these benefits is evidenced by the fact that certain railroads have during the past year authorized relatively large expenditures for improved yard illumination.

NOVALUX FLOODLIGHTING PROJECTORS

FORMS L-22, L-24, AND L-25

APPLICATION (Cont'd)

GENERAL REQUIREMENTS

In past years both pendent units and floodlighting projectors have been utilized for this service but at the present time opinion is almost universal that the most effective results are to be obtained by the use of floodlighting projectors. The requirements of a projector for service in the railroad yard are most severe. Satisfactory results can be obtained only with projectors which have been designed and constructed for this specific duty.

Material

Because of the fact that injurious gases from the smoke of the locomotives are ever present in the railroad yard, it is most important that the material from which the unit is constructed be impervious to attack from these gases. The units are at all times exposed to the weather and should, therefore, be weatherproof and of a material which does not rust. These two requirements indicate that a cast aluminum alloy construction would be most suitable.

Fig. 3
(Photo No. 277378)
Form L-24 Floodlighting Projector With Visor

Mechanical Details

The projectors are as a rule mounted on high towers where space for the electrician or maintenance man is limited. In many cases the platform from which these men must operate is at the rear of the unit and in such cases it is most important that they be able to relamp or clean the projector from the rear without changing the direction of the beam. The best way to provide for this is by the use of a unit which has a hinged back door.

Photometric Results

The determining factor on the quantity of light in the yard is the value of beam lumens from the projector; consequently careful consideration should be given to the efficiency of the unit. Since in many cases the throw is 1000 ft. or more, the unit must have a high value of central beam candle power. Towers and space in the railroad yard are very expensive and anything that can be done to reduce the number of projectors necessary to light a given area is a most important consideration. With the above-mentioned points in mind, the engineers of the General Electric Company have developed railroad yard lighting projectors which possess all these advantages, as may be observed from an examination of the construction specifications listed below.

Because of their high lighting efficiency these projectors are most economical. They are suitable for intensive large-area lighting and are particularly adapted for the lighting of railroad yards and the floodlighting of large buildings and signs. Standard 110-or 220-volt, 750- to 1000-watt, general service (base up) burning lamps can be used in the L-22 and L-24 projectors while the 110-volt, 1000-watt (base down) burning floodlighting lamp can be used in the L-25 projector. The most economical results are obtained with the larger lamps.

Fig. 4
(Photo No. 277397)
Form L-25 Floodlighting Projector With Visor

RECOMMENDATIONS

It is not recommended that the L-22 projector be used for railroad yard lighting unless it is desired to use the 1500-watt lamp. This is essentially a large-area unit.

The L-24 and L-25 projectors are better adapted for railroad yards on account of being dustproof, but must **never** be used with lamps exceeding 1000 watts capacity.

CONSTRUCTION

The units have a cone-shaped, two-part casing of aluminum alloy and a hinged front door and a hinged rear section for relamping or cleaning, from the back of the projector, without disturbing the direction of the beam. The focusing mechanism is of the split ball and socket type with retarding spring and single clamping screw, allowing movement of the socket in any direction. This movement is absolutely necessary in order to focus accurately the lamp. The retarding spring prevents lamp breakage and further facilitates focusing.

NOVALUX FLOODLIGHTING PROJECTORS
FORMS L-22, L-24, AND L-25

CONSTRUCTION (Cont'd)

The L-22 projector is provided with shielded outlets at the top and bottom for ventilation and can use the 1500-watt lamp. The L-24 and L-25 projectors are totally enclosed.

The L-22 and L-24 projectors have the lamp socket at the top arranged for base-up burning lamps while the L-25 projector has the lamp socket at the bottom arranged for base-down burning lamp.

Each projector is provided with two reflectors; the front unit, of patented parabolic shape, is attached to the stationary part of the projector; the rear unit, of shallow parabolic and spherical sections, is attached to the movable rear door. These reflectors are of blown glass, silvered and hermetically sealed by a heavy coating of electrolytic copper which entirely envelops the outer surface of the mirror. The copper coating, in addition to protecting the glass, assists in radiating the heat from the lamp. This particular design of composite reflector gives a greatly increased value of central beam candle power and beam lumens over other comparable projectors.

The front door is fitted with heat-resisting, pressed glass, either clear or lightly stippled. The light stipple in the glass tends to smooth out any high spots in the beam.

The casing and door of the projector are of cast aluminum; the ventilating cowl is of copper. All screws and bolts are of non-rusting materials.

The trunnion bracket is band iron, heavily lead plated. The swivel and base are cast-iron, heavily lead plated. This trunnion bracket and swiveled base allow the adjustment of the beam in any direction.

All joints are made weatherproof by the use of sponge-rubber gaskets.

HOW TO FOCUS

In focusing, care should be taken to see that the center of the lamp filament is in the exact center of the rear reflector. It is also important that the filament be brought into the focal point along the horizontal axis at right angles to the adjustment mentioned above.

ILLUMINATION DATA

FORM	WORKING DISTANCE	LAMP 115 VOLT	FRONT-DOOR GLASS	BEAM			TOTAL LUMENS	F	PHOTOMETRIC CURVE
				Angle	Candles	Lumens			
L-22	Up to 1500 ft.	1500-watt General Service	Clear	22°	336,000	13,100	21,500	0.39	H-131443
			Lightly Stippled	28°	232,000	12,350	20,900	0.50	H-131444
	Up to 1500 ft.	1000-watt General Service	Clear	20°	275,000	8,750	15,000	0.35	H-130983
			Lightly Stippled	32°	140,000	9,400	14,500	0.57	H-130984
L-24	Up to 1500 ft.	1000-watt General Service	Clear	20°	275,000	8,750	15,000	0.35	H-130983
			Lightly Stippled	32°	140,000	9,400	14,500	0.57	H-130984
L-25	Up to 1500 ft.	1000-watt Floodlighting	Clear	14°	550,000	7,000	12,950	0.25	H-131590
			Lightly Stippled						

Beam diameter in feet = Distance from projector in feet × Factor F.

LAMP DATA

USED WITH	WATTS	VOLTS	BASE	BULB (Clear Glass)	LIFE in Hours	LUMENS	LIGHT CENTER LENGTH (In.)	MAXIMUM OVERALL DIMENSION (In.)	SERVICE	LIST PRICE	STD. PKG. QTY.
L-22 Projector	1500	110, 115, 120	Mogul	PS-52	1000	30,000	9 1/2	13 1/8	General	**$5.00**	8
L-22 and L-24 Projectors	1000	110, 115, 120	Mogul	PS-52	1000	21,000	9 1/2	13 1/8	General	**3.75**	8
L-22 and L-24 Projectors	750	110, 115, 120	Mogul	PS-52	1000	15,000	9 1/2	13 1/8	General	**3.50**	8
L-25 Projector	1000	110, 115, 120	Mogul	G-40	800	18,000	5 3/16	7 7/8	Floodlighting	**6.75**	12

Prices subject to change without notice.

DIMENSIONS

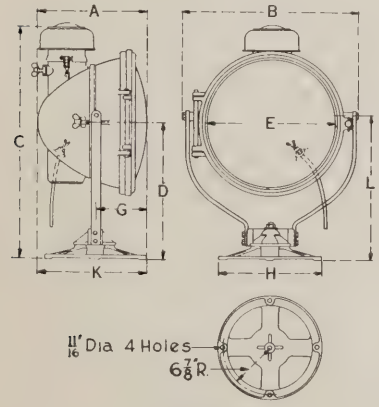


Fig. 5
(K-1257798)
Form L-22 Floodlighting Projector

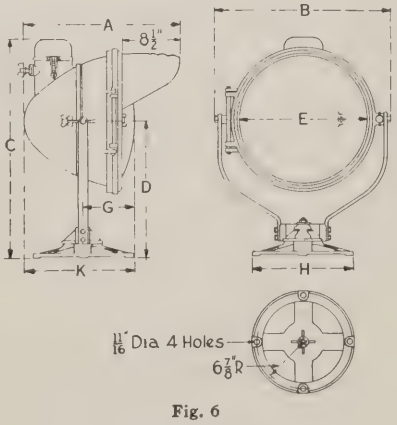


Fig. 6
(K-1279441)
Form L-24 Floodlighting Projector

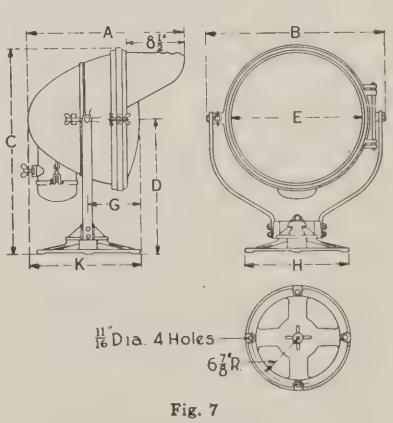


Fig. 7
(K-1279466)
Form L-25 Floodlighting Projector

FORM	FIG. NO.	DIMENSIONS IN INCHES								
		A	B	C	D	E	G	H	K	L
L-22	5	16	26	33 1/2	19 1/16	19	6 5/8	15	16	20
L-24	6	22 3/4	25 7/8	32 3/4	19 15/16	19	6 5/8	15	16	..
L-25	7	22 3/4	25 7/8	30 13/16	19 15/16	19	6 5/8	15	16	..

NOVALUX INCANDESCENT SEARCHLIGHTS

DIMENSIONS

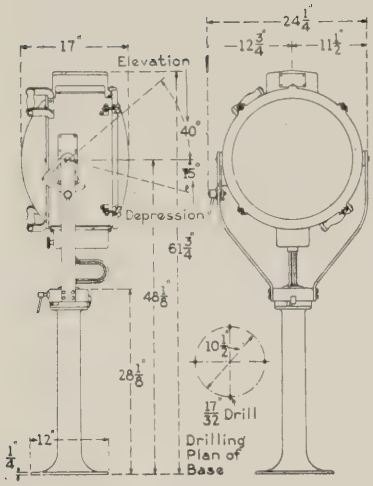


Fig. 6
(T-1256086)
18-in. Hand-control Incandescent Searchlight

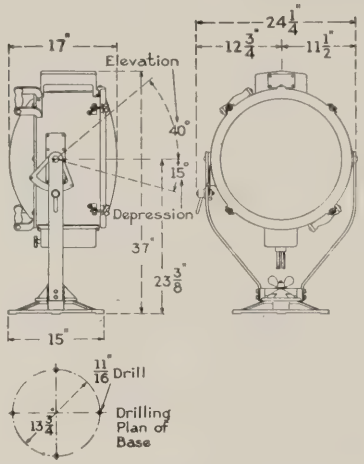


Fig. 7
(P-1257762)
18-in. Hand-control Incandescent Searchlight with Swivel and Trunnion Base

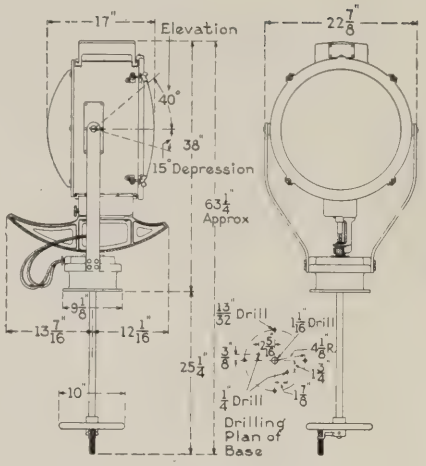


Fig. 8
(P-1256096)
18-in. Pilot-house Control Incandescent Searchlight

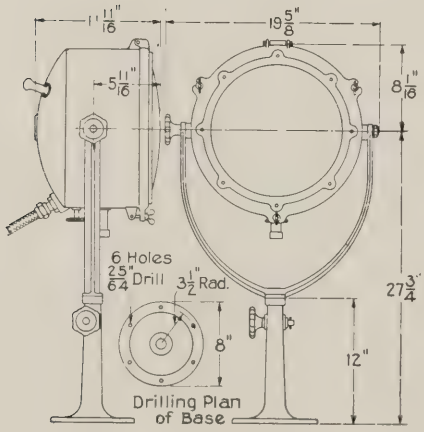


Fig. 9
(K-1272663)
12-in. Hand-control Incandescent Searchlight Form J-69

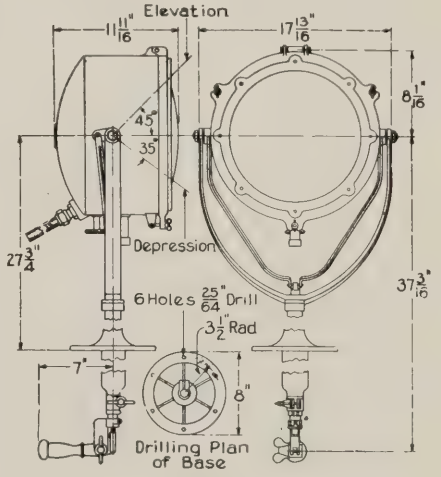


Fig. 10
(K-1272540)
12-in. Pilot-house Control Incandescent Searchlight Form J-68

NOVALUX INCANDESCENT SEARCHLIGHTS

ILLUSTRATIONS

Fig. 1
(Photo No. 272477)
Hand-control 18-in. Incandescent Searchlight
(Pedestal Mounting)

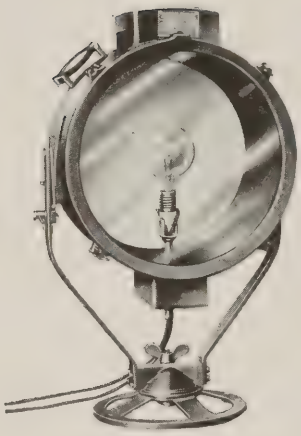


Fig. 2
(Photo No. 275345)
Hand-control 18-in. Incandescent Searchlight
(Swivel and Trunnion Mounting)

Fig. 3
(Photo No. 274987)
Pilot-house Control 18-in. Incandescent Searchlight

Fig. 4
(Photo No. 275681)
Hand-control 12-in. Incandescent Searchlight
Form J-69

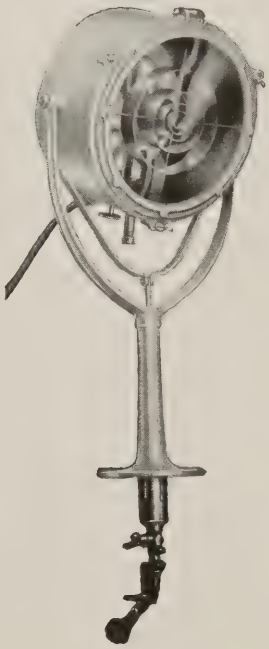


Fig. 5
(Photo No. 273397)
Pilot-house Control 12-in. Incandescent Searchlight
Form J-68

NOVALUX INCANDESCENT SEARCHLIGHTS

DESCRIPTION			FIG. NO.	CAT. NO.	LIST PRICE	WT. IN LB. (Approx.)		DIMENSIONS See Page 3 Fig. No.
Size	Control	Mirror				Ship.	Net	
18-inch	Hand	Silvered Glass	1	248807	**$245.00**	300	127	6
		Metal		248806	**160.00**	300	125	
	Pilot House	Silvered Glass	3	248809	**270.00**	290	122	8
		Metal		248808	**200.00**	290	120	
	Swivel and Trunnion	Silvered Glass	2	3049393	**235.00**	210	102	7
		Metal		3049392	**165.00**	210	100	
12-inch Form J-69	Hand	Silvered Glass	4	297508	**100.00**	65	45	9
12-inch Form J-68	Pilot House	Silvered Glass	5	290066	**100.00**	75	50	10

ACCESSORIES

Transformer	Type M, 60-cycle, 110-30-volt, 1500-watt	298237	**$22.50**	50	35	
	Type M, 60-cycle, 110-12-volt, 1500-watt	146139	**30.00**	55	40	
Resistance	For operating 600-watt, 30-volt lamp on 40-volt storage battery	290067	**6.50**			
	For operating 600-watt, 30-volt lamp on 110/125-volt, d-c. circuit	2208687	**15.00**			
Socket and Carriage	For using 1200-watt, 12-volt MAZDA lamp in 18-in. searchlight	290861	**Additional to Net Price $16.00**			

SPECIAL FRONT DOORS

Diverging front-door glass for 18-in. searchlight	10 degree	Add to **Net Price** of Searchlight	**$50.00**
	20 degree		**60.00**
	30 degree		**68.00**
	40 degree		**75.00**

INCANDESCENT LAMPS

WATTAGE	VOLTAGE	BASE	BULB	STD. PKG. QTY.	LIST PRICE	WATTAGE	VOLTAGE	BASE	BULB	STG. PKD. QTY.	LIST PRICE
FOR 12-IN. SEARCHLIGHTS											
600	30	Mogul	T-20	6	**$6.00**	500	110/125	Mogul	T-20	6	**$6.00**
FOR 18-IN. SEARCHLIGHTS											
1000	110-125	Mogul	G-40	12	**$7.50**	1000	32-34	Mogul	G-40	12	**$8.25**
1000	110-125	Mogul	T-20	6	**6.50**	900	30	Mogul	T-20	6	**6.75**
1500	110-125	Mogul	G-40	12	**9.00**	†1200	32	No. 1838	G-40	12	**12.50**

† Requires special socket listed above.
Prices subject to change without notice.

NOVALUX INCANDESCENT SEARCHLIGHTS

APPLICATION

Novalux incandescent searchlights are designed for projecting beams of light upon distant objects by the use of high-current incandescent lamps. They are particularly applicable to illumination of construction work, spectacular displays, or long distance floodlighting, in addition to the usual uses on board ship for picking up buoys, and in emergencies.

The 18-in. searchlight uses lamps of 900, 1000, 1200, or 1500 watts where the maximum beam candle power is desired. It can also be furnished with diverging doors for spreading the beam in one plane to angles of 10, 20, 30, and 40 degrees.

The 12-in. searchlights were especially designed for use on 75-foot power boats, similar to those used by the New York Harbor Police and U.S. Coast Guard. The power available on these boats is limited to the capacity of the storage battery. As no ventilation is provided, the maximum lamp wattage recommended is 600.

Two types of control are furnished, hand and pilot-house. The hand-control is used where it is convenient for the operator to stand at the searchlight and train the beam. The pilot-house control is for operation from inside a pilot house or shelter. The swivel and trunnion mounting is used where the searchlight beam is fixed in location and does not need to be changed frequently.

ILLUMINATION

The following table and charts give the illumination produced by these searchlights with the several lamp and reflector combinations.

Refer to Curves Figs. 11, 12	WATTAGE	VOLTAGE	BULB	FILAMENT	LIFE IN HOURS	BEAM CANDLEPOWER 18-IN. SEARCHLIGHT		BEAM LUMENS Silvered Glass Mirror
						Metal Mirror (Approximate)	Silvered Glass Mirror	
B	900	30	T–20	C–13	50	2,000,000	4,200,000	5700
C	1000	32/34	G–40	C–5	100	1,300,000	2,250,000	4450
..	1000	110/125	G–40	C–5	100	650,000	1,300,000	....
..	1000	110/125	T–20	C–13A	50	850,000	1,700,000	....
A	*1200	12	G–40	C–14	100	2,650,000	5,100,000	6800
D	*1500	110/125	G–40	C–13	800	500,000	970,000	6300
						BEAM CANDLE POWER 12-IN. SEARCHLIGHT		
							Silvered Glass Mirror	
G	600	30	T–20	C–13	50		560,000	3050
H	500	110–125	T–20	C–13	50		400,000	2650

*Requires special socket. See Page1.

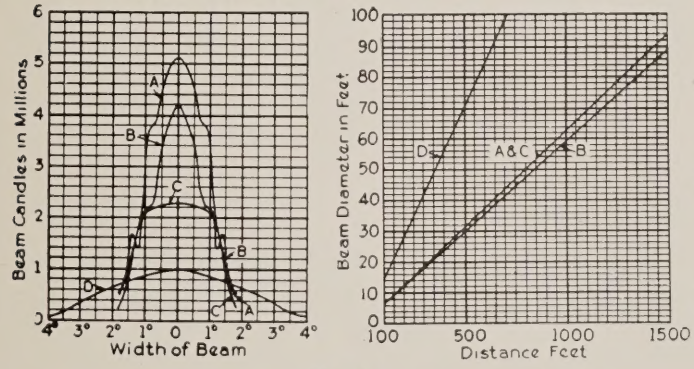


Fig. 11
18-in. Searchlight with Silvered-glass Mirror

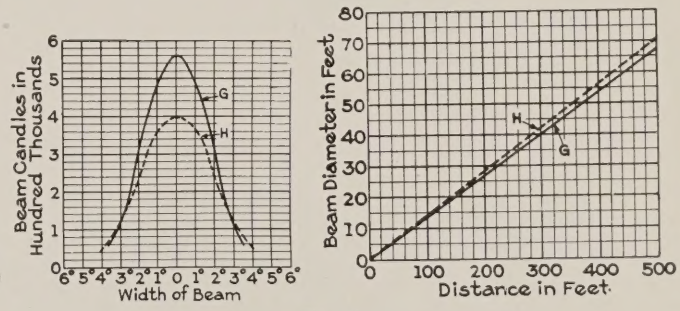


Fig. 12
12-in. Searchlight with Silvered-glass Mirror

INCANDESCENT LAMPS

The table on Page 16 shows the incandescent lamps which may be used with the searchlights.

For maximum candle power, it is recommended that the lamps of lower voltages be used, as in these lamps a higher concentration of filament is obtained. However, they have relatively short life and where replacement cost must be considered, as in applications where continuous burning is necessary, lamps which have a longer life are recommended.

The 110- to 125-volt lamps may be operated directly from standard commercial circuits while transformers or resistances are listed for operation of the low-voltage lamps.

CONSTRUCTION

18-IN. SEARCHLIGHTS

The 18-in. searchlights are of cast-iron and sheet-steel construction treated with black japan. A ventilating dome is located at the top of the drum. The door is of heat-resisting glass mounted in a cast-iron frame and attached to the drum by swing bolts. Focusing of the lamp with respect to the mirror may be accomplished outside of the drum by means of a knurled knob at the rear. Handles are provided at the rear of the hand-control searchlight, to train the beam in azimuth and elevation. The glass reflector is 18-in. in diameter and is made to conform with U.S. Navy specifications. The silvering is protected by electrolytic copper backing. Mechanical injury to the mirror is prevented by a sheet-steel dome attached to the rear of the drum.

The pilot house control allows movement of the beam to be accomplished by means of a single handle, projecting through the pilot-house roof. The beam is elevated or depressed by a circular rack and pinion.

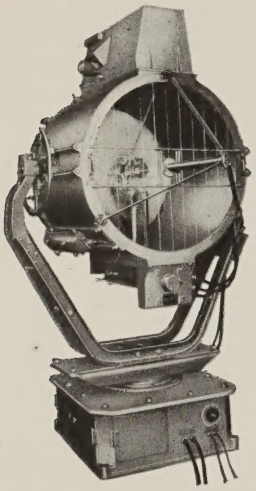
12-IN. SEARCHLIGHTS

The 12-in. searchlights are made for marine service, the castings being of a non-corrosive aluminum alloy. The drum is a single casting to which the frame for the front-door glass is attached by hinges. This glass is heat resisting, being convex to provide additional strength. A rubber gasket is placed between the door frame and the drum. A universal focusing mechanism is provided so that the lamp may be focused in the mirror from outside of the drum.

36-IN. HIGH-INTENSITY BEACON
(CONTINUOUS ROTATION SEARCHLIGHT)

DESCRIPTION	VOLTS		AMPERES	LIST PRICE	SHIP. WT. in Lb. (Approx.) Including Std. Eqpt.	NET WT. IN LB. (Approx.)	
	Arc	Line				Search-light	Rheo-stat
36-in. High-intensity Searchlight, Continuous Rotation.....	80	110–125	150	**$4000**	2150	1445	317

Prices subject to change without notice.



(Photo No. 432632)
Fig. 1

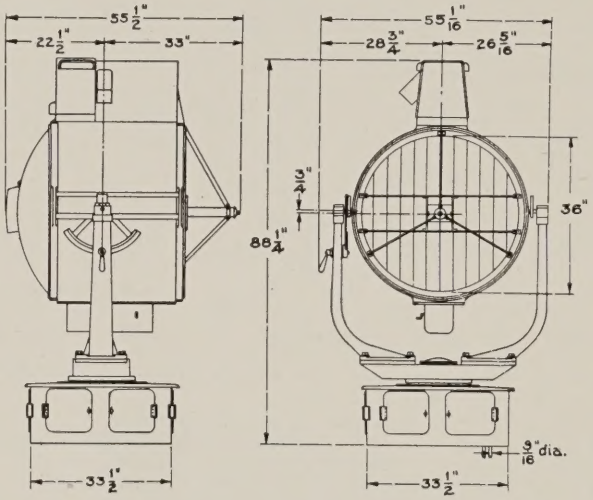


Fig. 2

DESCRIPTION

The 36-in. high-intensity continuous rotation searchlights were originally designed as aviation beacons for use at main fields of the Air Mail Service. They are especially suited for spectacular display illumination. When mounted on the top of a tall building or tower, they attract much attention over a large area, on account of the high-intensity, peculiar bluish beam.

CONSTRUCTION

The base contains two motors, one for rotating the searchlight at 6 r.p.m. and one at ¼ r.p.m. The slip rings and gears are also in the base, in which five covered openings are provided for inspection. A switch is provided for changing speed of rotation. The searchlight revolves on ball bearings on a hollow shaft. The lamp mechanism is fully automatic, using thermostat control. The mirror is of best quality glass carefully ground and polished, and silvered on the back.

This searchlight operates only on direct current.

CARBONS

Positive 16 mm. dia. by 36 in. long
Negative 11 mm. dia. by 12 in. long
} One pair of carbons will burn for 2½ hours.

Beam candle power 350,000,000.

AVIATION FIELD BOUNDARY LIGHT

DESCRIPTION	LAMP USED (Not Included in Cat. No. or Price)	CAT. NO.	List Price	WT. IN LB. (Approx.) Ship.	Net
Aviation Field Boundary Light, Clear Globe, Series	600–1000 Lumen 60–100 C.P.	293473	$12.25		
Aviation Field Boundary Light, Clear Globe Inside Etched, Series		293474	12.25		
Aviation Field Boundary Light, Ruby Globe, Series		293475	12.25		
Aviation Field Boundary Light, Green Globe, Series		293476	12.25		
Avitaion Field Boundary Light, Clear Globe, Multiple	40–100 Watt	293477	12.25		
Avitaion Field Boundary Light, Clear Globe Inside Etched, Multiple		293478	12.25		
Aviation Field Boundary Light, Ruby Globe, Multiple		293479	12.25		
Aviation Field Boundary Light, Green Globe, Multiple		293480	12.25		
All the above complete with base and 4-ft. pipe support.					
Clear Globe only	.....	2363787	$1.00		
Clear Globe Inside Etched only	.....	2346117	1.00		
Ruby Globe only	.....	2346112	1.00		
Green Globe only	.....	2346111	1.00		
Casing and Socket, Series	600–1000 Lumen	3706239G1	8.50		
Casing and Socket, Multiple	60–100 C.P.	3706239G2	8.50		
Pipe Support 1¼-in. Iron Pipe 4-ft. long	.....	2369660	1.00		
Base	.....	1340650	1.75		

Prices subject to change without notice.

DESCRIPTION

Boundary lights are used to mark the boundaries of aviation fields so that oncoming pilots can see a pattern of the field. They are spaced approximately 250 feet apart. Where any quantity is required, it is advisable to use a constant-current system, with No. 8 A.W.G parkway cable. However, multiple sockets are listed for use where series circuits are not advisable.

Clear and inside-etched globes are used for boundary markers. Ruby globes are used for obstruction markers, being placed on pole lines and the highest points of buildings which are considered obstructions to taking off or landing. Green globes are placed to indicate the most favorable approaches to the field. The base is usually buried in the ground to a depth of about 18 inches and secured with crushed stone or concrete. For the series system, current is supplied by a constant-current transformer, either station or pole type.

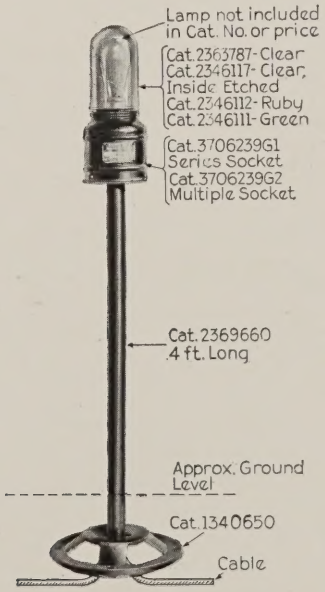


Fig. 2

GENERAL ELECTRIC COMPANY

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SALES OFFICES (Address nearest Office)

Akron, Ohio....159 South Main Street
Atlanta, Ga....123 Spring Street
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Birmingham, Ala....602 North Eighteenth Street
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Buffalo, N. Y....39 East Genesee Street
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Des Moines, Iowa....418 West Sixth Avenue
Detroit, Mich....700 Antoinette Street
Duluth, Minn....14 West Superior Street
Elmira, N. Y....342 East Water Street
El Paso, Tex....109 North Oregon Street
Erie, Pa....10 East Twelfth Street
Fort Wayne, Ind....1635 Broadway
Grand Rapids, Mich....201 Monroe Avenue
Hartford, Conn....18 Asylum Street
Houston, Tex....1016 Walker Avenue
Indianapolis, Ind....106 North Illinois Street
Jackson, Mich....212 Michigan Ave., West
Jacksonville, Fla....11 East Forsyth Street
Kansas City, Mo....1004 Baltimore Avenue
Knoxville, Tenn....602 South Gay Street
Little Rock, Ark....223 West Second Street
Los Angeles, Cal....5201 Santa Fe Avenue
Louisville, Ky....455 South Fourth Street
Memphis, Tenn....130 Madison Avenue
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Milwaukee, Wis....425 East Water Street
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Nashville, Tenn....234 Third Avenue, North
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Niagara Falls, N. Y....201 Falls Street
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Omaha, Neb....409 South Seventeenth Street
Philadelphia, Pa....1321 Walnut Street
Phoenix, Ariz....11 West Jefferson Street
Pittsburgh, Pa....535 Smithfield Street
Portland, Ore....329 Alder Street
Providence, R. I....76 Westminster Street
Richmond, Va....700 East Franklin Street
Rochester, N. Y....89 East Avenue
St. Louis, Mo....112 North Fourth Street
Salt Lake City, Utah....200 South Main Street
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San Francisco, Cal....116 New Montgomery Street
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Los Angeles....5203 Santa Fe Avenue
Minneapolis....410 Third Ave., North
New York....627 Greenwich Street
Philadelphia....1223 Washington Avenue
St. Louis....1009 Spruce Street
Salt Lake City....370 West Second South Street
Seattle....1508 Fourth Ave. South

Special service divisions are also maintained at the following works of the Company: Bloomfield, N. J.; Erie, Pa.; Ft. Wayne, Ind.; Oakland, Calif.; Pittsfield, Mass.; Schenectady, N.Y.; and West Lynn, Mass.,—River Works and West Lynn Works.

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SPAIN AND COLONIES: Sociedad Iberica de Construcciones Electricas, Madrid, Barcelona, and Bilbao
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July, 1927 (3m)